

Cooperative State, Research, Education
and Extension Service

CSREES Animal Production & Animal Well-Being Portfolio

Deb Hamernik, PhD

National Program Leader, Animal Physiology
USDA-CSREES Plant & Animal Systems (PAS) Unit
dhamernik@csrees.usda.gov

ARS & CSREES Animal Production National Planning Workshop
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CSREES Animal Production Team:

Peter Brayton; Animal Protection (Well-Being) (NRI)

Pete Burfening; Animal Genome (NRI) & SBIR

Basil Eastwood; Dairy (PAS)

Deb Hamernik; Animal Physiology (PAS)

Mark Mirando; Animal Reproduction (NRI)
Animal Growth & Nutrient Utilization (NRI)

Muquarrab Qureshi; Animal Genetics (PAS)

Rich Reynnells; Poultry (PAS)



Mission

The mission of CSREES is to advance knowledge for agriculture, the environment, human health and well being, and communities.

“Extramural” funding, national program leadership, and administration of Federal assistance



www.csrees.usda.gov



USDA Strategic Goals

1. Enhance economic opportunities for agricultural producers
2. Support increased economic opportunities & improved quality of life in rural America.
3. Enhance protection & safety of the nation's agriculture & food supply
4. Improve the nation's nutrition & health
5. Protect & enhance the nation's natural resource base & environment



www.csrees.usda.gov/about/strat_plan.html



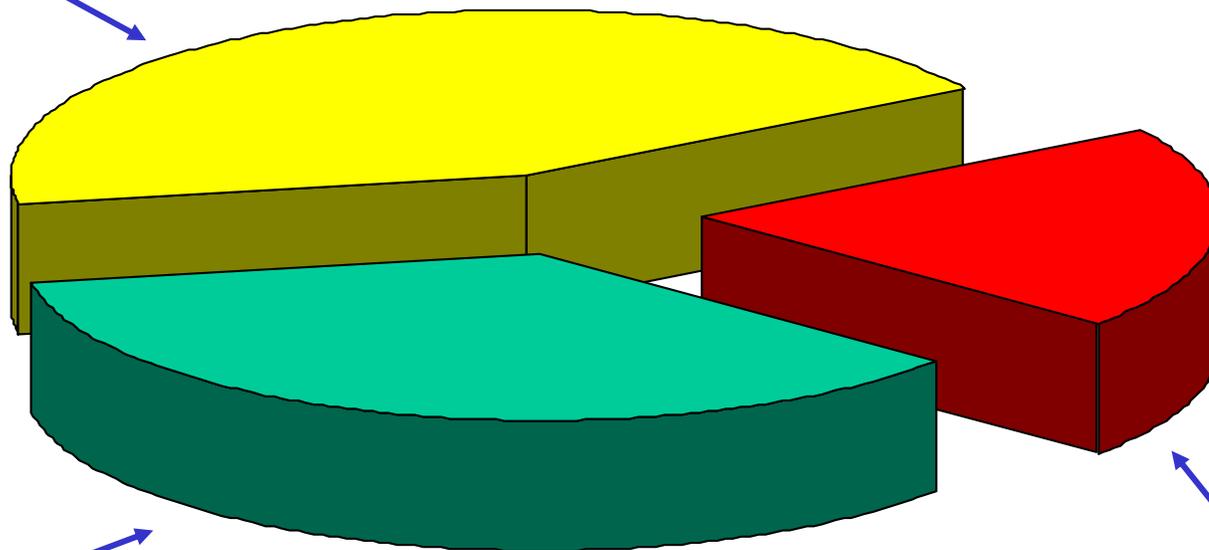
CSREES Animal Production Portfolio

- Focus on **quantity** & efficiency of production
- Improvements still needed in:
 - Feed efficiency
 - Reproductive efficiency
- Consistent **quality** of product
- Enhanced nutrient composition
- Sustainable production practices (environmental, economical, social) that are acceptable to consumers



CSREES Budget FY2006 (\$1.199 B)

Formula Funds - 44%

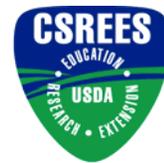


Competitive Grants - 36%

Noncompetitive Grants - 20%

Formula Funds (FY2006):

Hatch (research)	\$177 million
Evans-Allen (1890 institutions)	37
Animal Health (section 1433)	5
McIntire-Stennis (forestry)	22
Smith-Lever (extension)	<u>273</u>
Total:	\$514 million



Formula Funds:

- Hatch Act (1887) allocated funds for research to promote sound and prosperous agriculture & rural life
- Hatch funds are allocated to the **SAES Director** of the 50 states, DC, Puerto Rico, Guam, Virgin Islands, Micronesia, American Samoa, and Northern Marianas Islands.



Formula Funds:

- Hatch Act was amended in 1955 to a “fixed base” with any amount in excess of the 1955 base distributed as:
 - 20% allotted equally to each state
 - an amount proportional to each state’s share of the total U.S. **rural** population
 - an amount proportional to each state’s share of the total U.S. **farm** population



Formula Funds:

- 1998 AREERA legislation requires:
 - every state to fully match Hatch funds from non-Federal funds
 - 25% of Hatch funds be spent on **multi-state committees**:
 - Bring scientists together to address common issues
 - Share information and resources
 - Minimize duplication of effort and resources
 - Annual meeting and reporting

Formula Funds (FY2006):

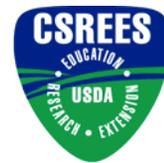
- Multi-state committees (285 total):
 - Animal genomics = 9
 - Animal nutrition = 9
 - Animal reproduction = 8
 - Animal protection/health = 8
 - Well-being or stress = 3
 - Muscle biology/meat products = 3
 - Management/sustainability = 9

 - Air/water quality with animal components = 7
 - Wildlife (deer) = 3



Formula Funds (FY2006):

- NRSP-8 National Animal Genome Research Program:
 - Initiated in 1993
 - \$400,000/yr "off the top" Hatch
 - Cattle/sheep/goats; swine; poultry; horses; aquaculture; bioinformatics
 - Goals:
 - Enhance & integrate genetic & physical maps for comparative genomics and sequence annotation
 - Facilitate integration of genomic, transcriptional, proteomic, metabolomic approaches to understand biological mechanisms underlying economically important traits
 - Facilitate & implement bioinformatic tools to extract, analyze, store, and disseminate information



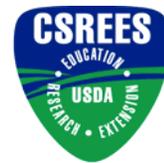
Impacts of Formula Funds:

- Hatch funds require matching dollars from non-federal sources
- Used to address local or regional issues
- **Infrastructure:**
 - Salaries
 - Animals, facilities, equipment



CSREES Competitive Programs:

- **Research:**
 - National Research Initiative (NRI)
 - Biotechnology Risk Assessment Grants (BRAG)
 - Small Business Innovation Research (SBIR)
- **Integrated Programs:**
 - Any 2 of 3 functions: research, education, extension
 - NRI integrated authority (2003 Appropriations Bill)
 - Section 406 (authorized by AREERA in 1998)
 - 406 Integrated Organic Program
 - 406 Integrated Water Quality Program



The Process for Setting Priorities:

- Mission relevance
- Legislative authority from Congress
- Potential impact
- **Stakeholders:** shared long-term goals
- White papers & planning documents (NASULGC, NRC, partners, etc.)
- Linkages to other Programs/minimize overlap and duplication

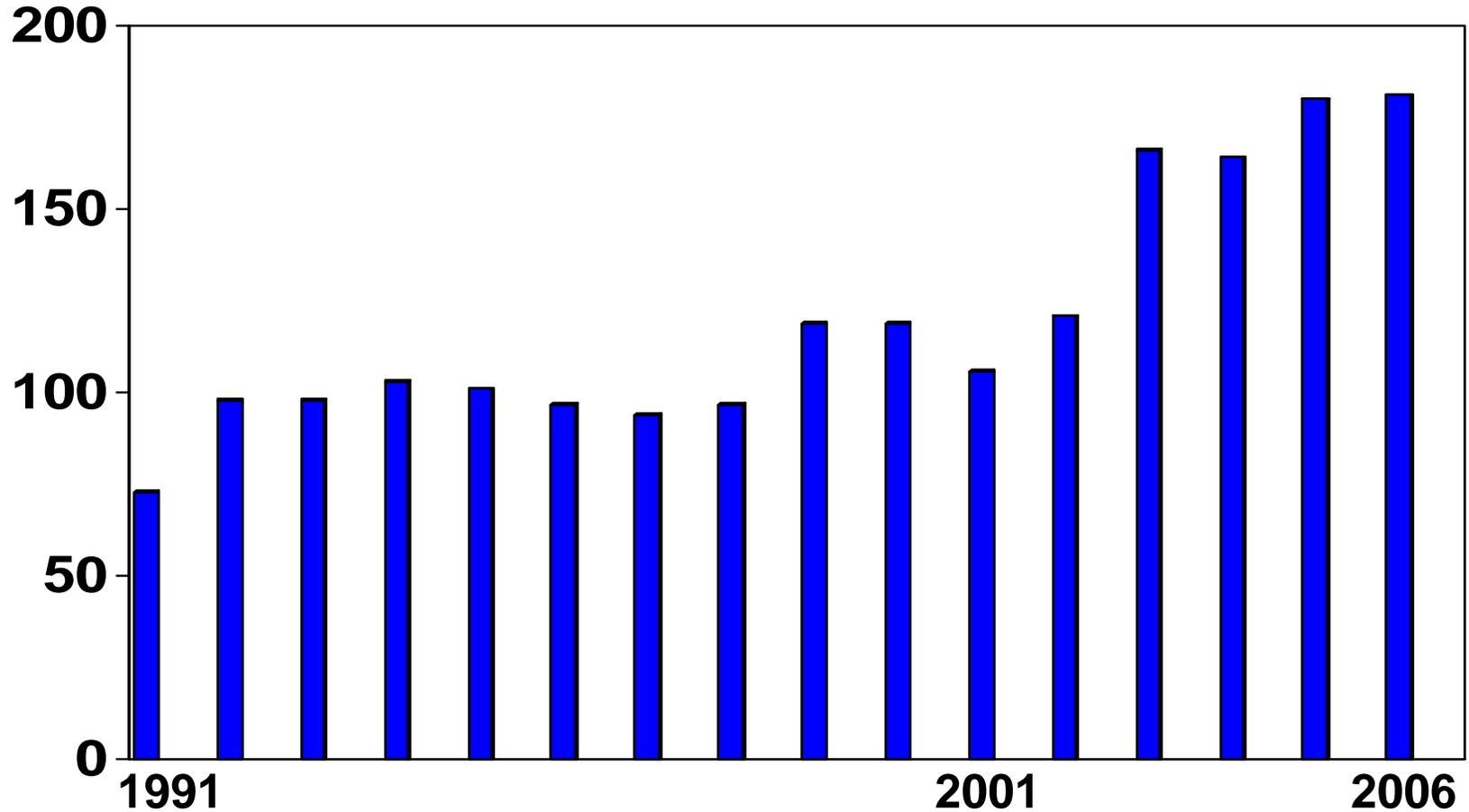
National Research Initiative (NRI):

- Fundamental and mission-linked research (basic & applied)
 - At least 40% of funds for mission-linked
- Integrated Approaches (two of the three functions: research, education, extension)
 - Up to 22% of funds for integrated activities
- Biological, physical, social sciences
- Single Discipline or multidisciplinary
 - At least 30% of funds for multidisciplinary
- One investigator or teams
- Broad Eligibility



NRI Appropriations (\$ millions)

(NRI authorized to \$500 million)



NRI Statistics:

	<u>2001</u>	<u>2004</u>
NRI Appropriation (\$M)	\$105.7	\$164.0
# Programs	23	32
# Proposals Submitted	2593	3392
Average Duration (yrs)	2.4	2.9
Average Award Size	\$188,116	\$358,560
# Awards (% success)	597(23%)	524(14%)



ARS Success in NRI:

	<u>FY2004</u>	<u>FY2005</u>
Number of ARS Applications:	166	126
Number of Awards to ARS:	16	18
ARS % Success:	10%	14%
\$ Awarded to ARS (millions)	\$4.88	\$5.07



FY2006 NRI Planned Investments:

Animal Genomics	\$12 M
Porcine Genome Sequencing	\$5
Animal Growth & Nutrient Utilization	\$4.5
Animal Reproduction	\$4
Animal Protection: Well-Being	<u>\$1.5</u>
Total	\$25 M
Air Quality	\$5 M
Water & Watersheds	\$5.3
Ag Prosperity in Small- & Mid-Sized Farms	\$5



NRI Animal Genome Goals:

Identify candidate genes for economically important traits that can be quickly tracked, monitored or manipulated to improve animal health, product quality, and production efficiency.



www.csrees.usda.gov/fo/animalgenomicsnri.html



NRI Animal Genome Highlights:

- Targeted SNP analysis of the porcine ovulation rate QTL (Rund, LA; University of Illinois)
- Detection of QTL affecting health, fertility, calving ease, & milk composition in a Holstein X Jersey backcross
(Weigel & Hoffman; University of Wisconsin)
- Detection, identification, & utilization of QTL for feed efficiency & carcass traits in a commercial beef cattle population.
(Taylor & Schnabel; University of Missouri)



www.csrees.usda.gov/fo/animalgenomicsnri.html



NRI Animal Genome:

Bovine Genome Sequencing (\$10 million)

- \$5 million in each of FY2003 & 2004
- Total funding: \$52 million
- Richard Gibbs & George Weinstock (Baylor)
- 8X coverage of 90% of the bovine genome

Impacts:

- facilitates cloning of specific genes
- facilitates antibody design & production
- animal identification
- parentage verification
- genome selection



NRI Animal Genome:

Porcine Genome Sequencing (\$10 million)

- \$5 million in each of FY2005 & 2006
- Larry Schook (University of Illinois)
Jane Rogers (Wellcome Trust Sanger Institute)
- 3X coverage of 90% of the porcine genome
- Launched Jan 2006 - expected finish Dec 2007
- ~\$1.2 million from National Pork Board, Iowa & NC Pork Producers, ISU, & NCSU



www.csrees.usda.gov/fo/porcinegenomesequencingnri.html



NRI Animal Growth & Nutrient Utilization Goals:

- 1) Improve quality and efficiency of meat and milk production;
- 2) Improve animal utilization of nutrients; and
- 3) Reduce output of nutrients into the environment as animal waste products.



NRI Animal Growth & Nutrient Utilization Highlights:

- Role of CLA isomers & related rumen biohydrogenation intermediates in the regulation of milk fat synthesis.
(Bauman, DE; Cornell University)
- Regulation of intestinal phosphate absorption (chicks) (Nemere, I; Utah State University)
- Improved growth of sow-reared piglets by enhancing arginine synthesis.
(Wu, G; Texas A&M University)



NRI Animal Reproduction Goals:

- 1) Improve fertility and decrease infertility;
- 2) Develop improved methods for sterilization and production of monosex populations of animals; and
- 3) Improve reconstitution of germplasm from preserved sources (including cryopreserved gametes and embryos).



NRI Animal Reproduction Highlights:

- Ubiquitin dependent proteolysis in farm animal spermatogenesis & fertilization.
(Sutovsky, P; University of Missouri)
- Sterilization vaccine for cattle.
(Reeves, JJ; Washington State University)
- Behavioral & morphological traits associated with fertility in broiler breeders.
(Estevez, I; University of Maryland)



NRI Animal Protection: Well-Being Goals:

Develop and implement effective animal care and use methods and systems contributing to the welfare, well-being, and humane treatment of food animals.



www.csrees.usda.gov/fo/animalprotectionnri.html



NRI Animal Protection: Well-Being Highlight:

- Determination of sensitivity & selectivity of a novel system for identifying lameness in dairy cattle. (Tasch et. al.; University of Maryland)

Objective: Develop an automated system for early detection of lameness in dairy cattle.

Impact: Reaction Force Detection system is patent pending and has been licensed to Bou-Matic, LLC (Madison, WI).



NRI Air Quality Goals:

- 1) Develop emission data for ag production practices that will lead to emission reduction targets, improve air quality and protect human and environmental health;
- 2) Develop mitigation strategies that will increase adoption of best management practices to reduce agricultural emissions;
- 3) Improve understanding of odor, gases, and particulate matter (PM) measurement, production, flux, fate and transport that will lead to a better understanding of the environmental fate of agricultural atmospheric emissions.

NRI Air Quality Highlight:

- Modeling the source of gaseous emissions from animal feeding operations.
(Powers, WJ; Iowa State University)

Impact: Feeding diets to swine with reduced amounts of crude protein, resulted in a 40-50% reduction in ammonia emissions with no negative performance on swine growth, ADG, or feed:gain.



NRI Water & Watersheds Goals:

- 1) Reduce pathogens such as bacteria, viruses and protozoa in waters derived from agricultural and rural watersheds.
- 2) Maintain adequate water supplies for agricultural crop and livestock production and rural use.



NRI Water & Watersheds Highlights:

- Assessing the risks to ground and surface waters from N- vs P-based manure application strategies
(Dou; University of Pennsylvania)
- Fate and transport of organoarsenic poultry feed additives in an agricultural watershed
(Schreiber et. al.; Virginia Tech)



NRI Small- & Mid-Sized Farms Goals:

- 1) Increase the value of agricultural products sold per farm by small and medium-sized farms through the adoption of environmentally sustainable, economically viable best management practices.
- 2) Increase the share of the food dollar accruing to the small and medium-sized farms and to rural communities by creating on-farm value added activities based on enhanced knowledge of the interactions between changing consumer needs, environmental sustainability and economic profitability.
- 3) Adopt ecological practices that will enhance the economic value of the land, operated by small and medium-sized farms.



406 **Integrated** Organic Program:

Goals:

- 1) Solve critical organic agriculture issues, priorities, or problems through the integration of research, education, and extension activities.
 - 2) Assist farmers & ranchers with whole farm planning & ecosystem integration
- FY2006: \$4.7 million
 - Program Director: Dr. Tom Bewick
(tbewick@csrees.usda.gov)



406 **Integrated** Organic Program Highlights:

- Slow-growing broilers in organic poultry production: an alternative to supplemental methionine and a marketing opportunity. (Emmert et. al.; University of Arkansas)
- Strengthening the scientific foundation of organic standards on animal health and welfare. (Lockeretz; Tufts University)
- Reducing off-farm grain inputs on northeast organic dairy farms. (Reberg-Horton et. al.,; University of Maine)



www.csrees.usda.gov/fo/integratedprograms.html



Sustainable Ag Research & Education (SARE):

Goal: Increase knowledge about, and help farmers and ranchers adopt, practices that are profitable, environmentally sound, and good to communities.

- FY2006: \$15 million
- Program Director: Jill Auburn
(jauburn@csrees.usda.gov)
- Research & Education grants: \$60k-150k
- Professional Development grants: \$20k-90k
- Producer grants: \$1k-15k



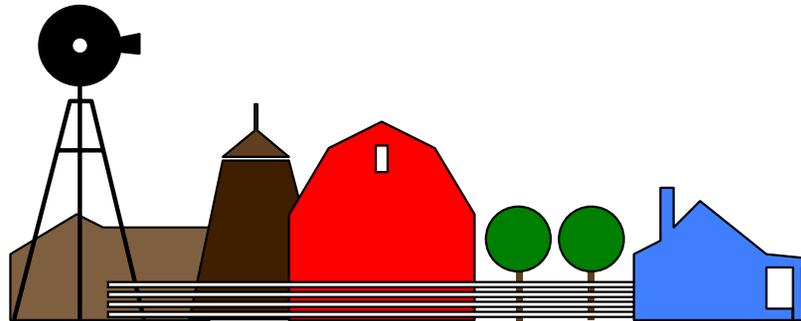
SARE Highlights:

- Grass-based dairy systems prove a water quality winner
- Improving a system: sheep, goat farmers explore state of the rumen
- Composting manure in layer houses transforms problem to product
- Cattle, pecan trees—an environmentally sound mix



USDA Biotechnology Risk Assessment Grants Program

Dan Jones (CSREES)
Chris Wozniak (CSREES)
John Radin (ARS)



USDA Biotechnology Risk Assessment Grants Program:

- Competitive grants program led by ARS & CSREES
- Authorized in 1990 & 2002 Farm Bills
- "...at least 2% withholdings from biotechnology outlays in USDA..."
- ARS, CSREES, Forest Service contribute \$\$
- FY2006: \$4 million
- Purpose: assist Federal regulatory agencies make science-based decisions about the safety of introducing genetically modified **animals**, plants, microbes into the **environment**



USDA Biotechnology Risk Assessment Grant Program Highlights:

Risk assessment of alpha-lactalbumin transgenic pigs.

(Wheeler, MB; University of Illinois)

Objective: Examine the potential routes of transgene DNA transmission and/or transgene product transfer to animals in a livestock production setting to begin risk assessment studies and inform the regulatory process for transgenic livestock.

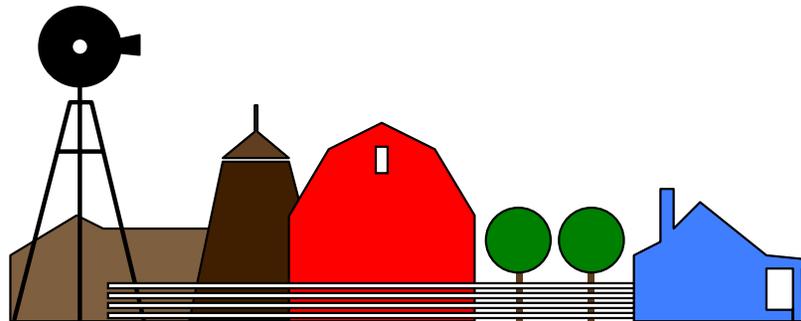


www.csrees.usda.gov/fo/biotechnologyriskassessment.html



USDA Small Business Innovation Research (SBIR)

Pete Burfening
Charles Cleland
Bill Goldner
Suresh Sureshwaran



SBIR:

- Research for the development of a profit-making technology, product, or service
- Government-wide program
- Small business is <500 employees
- 2.5% set-aside of USDA extramural funding for research
- CSREES, ARS, ERS, FAS, NASS, NRCS, APHIS contribute funding to this program



www.csrees.usda.gov/fo/sbir.html



SBIR:

- Phase I:
 - Feasibility projects
 - \$80,000 for 8 months
- Phase II:
 - Further development & commercialization plan
 - \$300,000 for 2 years



www.csrees.usda.gov/fo/sbir.html



University Involvement in SBIR:

- Strongly encouraged
- Faculty may serve as consultants or receive a subcontract (both limited to no more than 1/3 of Phase I award or $\frac{1}{2}$ of Phase II award) and continue to work full time at university
- Faculty may serve as Project Director on SBIR grants, by reducing university employment to 49% for duration of SBIR grant and if the SBIR research is performed some place other than university lab.
- Usually NOT acceptable for university faculty to serve as consultants and have all the SBIR research done in their lab.



www.csrees.usda.gov/fo/sbir.html



FY2006 SBIR “Animal” Topic Areas:

- Animal Production & Protection
 - Animal Waste Management
 - Aquaculture
 - Wildlife
-
- Air, Water, & Soil
 - Marketing & Trade
 - Rural & Community Development



www.csrees.usda.gov/fo/sbir.html



SBIR “Animal” Highlights:

- Enhancement of early development in turkeys by in ovo feeding.
(Ricks, CA; Embrex, Inc.)
- Commercialization of Versazyme, a keratinase product, for use in poultry food.
(Odetallah, NH; Bioresource International, Inc.)
- Testing the efficacy of a novel lameness detection system in commercial dairy herds.
(Nelson, B; Bou-Matic)



FY2004 CSREES Investment in Animal Production (\$M):

<u>KA*</u>	<u>Hatch</u>	<u>Other Formula</u>	<u>NRI</u>	<u>Other CSREES</u>	<u>Total CSREES</u>
301 Repro	6.6	1.8	3.9	2.1	14.4
302 Nutr Util	6.9	2.0	2.2	3.1	14.2
303 Gen Imp	3.2	0.4	1.2	3.5	8.4
304 Genome	2.9	0.2	11.3	0.8	15.3
305 Phys	4.0	2.0	1.9	0.8	8.6
306 Stress	1.1	0	0	1.1	2.2
307 Mgmt	3.5	2.3	1.2	6.1	13.2
308 Products	<u>1.1</u>	<u>0.2</u>	<u>0</u>	<u>1.4</u>	<u>2.6</u>
	29.2	8.9	21.9	18.8	78.9

*KA= Knowledge Area

FY2004 CSREES Investment in Animal Production* (\$M):

	<u>Hatch</u>	<u>Other Formula</u>	<u>NRI</u>	<u>Other CSREES</u>	<u>Total CSREES</u>
Beef	7.0	0.4	5.9	6.4	19.6
Dairy	8.8	0.7	7.7	4.6	22.0
Poultry	5.5	1.1	3.5	5.7	15.7
Swine	4.6	2.1	4.8	3.0	14.5
Sheep	1.6	0	0.5	1.5	3.7
Goats	0.2	3.9	0.3	0.8	5.1
Horses	0.7	0.1	0.9	0	1.8
Aquatic	1.4	1.5	1.9	10.5	15.3
Other**	<u>2.8</u>	<u>0.6</u>	<u>0.8</u>	<u>1.4</u>	<u>5.6</u>
	32.6	10.4	26.3	33.9	103.3

*Excludes investments in Animal Protection (KA 311-314; 722)

**Includes: companion and laboratory animals; cross-commodity research; and general research on multiple animal species.

Summary:

- 1) CSREES provides **extramural** funding for animal production research, education, and extension projects through Formula funds, competitive grants, and noncompetitive grants.
- 2) Priorities for CSREES competitive programs are determined by several factors, including stakeholder input.
- 3) Results of CSREES funded projects have increased animal production efficiency, developed sustainable production practices, and improved the quality of animal products leading to increased economic opportunities for producers.



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Questions?

Deb Hamernik
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